

REMARKS

Claims 1-16 remain in the application. Reexamination and reconsideration of the application are requested.

It is noted that the provisional double patenting rejection has been withdrawn.

Claims 1 and 6-8 are rejected under 35 U.S.C. 102(b) as anticipated by Jackson USP 5,793,871. Claims 9-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson in view of Chen USP 7,146,109. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson in view of Krause USPN 4448529. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson in view of Young 20060291859. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jackson in view of Soref USP 6,114,994. The rejections are respectfully traversed for the reasons presented below.

Introduction

Claims 1-16 are directed to methods and systems comprising a number of steps or features in combination. The claimed combinations are neither disclosed nor suggested in Jackson, viewed alone or together with other references.

For example, claim 1 recites a method for secure transmission of an information-containing optical signal in a reflective/transmissive architecture comprising a number of steps in combination. The claimed combination includes the steps of dividing the optical signal into a first plurality of spectral sub-bands, modifying each of the first plurality of spectral sub-bands to encrypt the information contained in the optical signal, combining the modified first plurality of spectral sub-bands into a combined optical signal, dividing the combined optical signal into a second plurality of spectral sub-bands, modifying each of the second plurality of spectral sub-bands to decrypt the previously encrypted information contained in the optical signal. The combined steps recited in claim 1 are neither disclosed nor suggested in Jackson.

Rejection of Claims 1 and 6-8 are Rejected Under 35 U.S.C. 102(b)
as Anticipated by Jackson USP 5,793,871

The following addresses language recited by independent claim 1.

1. Dividing an Optical Signal Into a First Plurality of Spectral Sub-Bands

Claim 1 requires that the optical signal must be divided into a first plurality of spectral sub-bands. There is no teaching or suggestion in Jackson of dividing an optical signal into a first plurality of spectral sub-bands, and the prior Office Actions fail to identify any such teaching or suggestion. Absent any teaching or suggestion of a combination including the step of dividing an optical signal into a first plurality of spectral sub-bands, the rejection based on Jackson is improper and must be withdrawn.

In response to the asserted failing of Jackson, the Examiner states:

Regarding argument there is no teaching or suggestion in Jackson of dividing an optical signal into a first plurality of spectral sub-bands and the 3/12/08 Office Action fails to identify those teachings, remark page 3 par. 2 and page 4 par. 3, argument is not persuasive because Jackson teaches a method of imprinting a package of digital data on a carrier light beam by using two-dimensional spatial light modulator and securing the light beam/analogue optical signal by encrypting it (see col. 3 lines 46-64 and abstract), Jackson also teaches a first electronic device electronically connected to a first spatial light modulator operating to split the first serial digital data stream into a first portion and a second portion and a combiner operating to combine the first portion of said first serial digital data stream and the encrypted serial digital data stream (see claim 21) that reads on dividing optical signal into first plurality of sub-bands. Moreover the 3/12/08 Office Action discloses this limitation on page 4 par. 5 lines 6-7 and page 3 lines 9-13.

Office Action at pages 2-3.

The Examiner's response fails to address Applicant's prior arguments contained in the Response filed September 11, 2008 in the distinguishing the subject matter of claim 1 over Jackson:

The 3/12/08 Office Action does assert that Jackson teaches an analog optical signal security system and a spatial light modulator splitting a first serial optical

digital data stream into a first portion and a second portion (see claim 21). The 3/12/08 Office Action asserts that this disclosure anticipates the spectral sub-bands defined by claim 1. Applicant respectfully disagrees.

Jackson teaches a method in which time domain data is first rastered to a 2-D spatial light modulator, the phase of each data byte (pixel) is altered, a 2-D hologram is created and then that data is rastered out into a serial data stream. There is no teaching or suggestion in Jackson that spectral sub-bands are created or operated upon. Jackson's claim 21 recites splitting a first serial digital data stream into a "first portion and a second portion." This clearly refers to serial demultiplexing of the data stream in order to separate the header data from the content data, corresponding to the teaching present in Jackson. Jackson is operating on data bytes (pixels), and Jackson's claim 21 is directed to how the header data (the "first portion" of the data stream) can bypass the encryption process. Jackson does not disclose or suggest operating on spectral sub-bands, and there is nothing in Jackson's claim 21 or elsewhere to suggest that Jackson is creating or operating on spectral sub-bands.

Response of September 11, 2008 at page 4.

That is, Jackson simply does not teach, describe, suggest or otherwise disclose a combination including "dividing the optical signal into a first plurality of spectral sub-bands." The portions of Jackson cited and relied upon by the Examiner include:

In one of several preferred embodiments of the present invention, a package of digital data is first imprinted on a carrier light beam. This is done by using a two-dimensional spatial light modulator. The phase of the data-bearing optical waveform is subsequently distorted by a phase-scrambling medium. Next, the data-bearing optical waveform with distorted phase is used to form an optical hologram with a reference beam. The hologram is then converted into electronic signals which are sent to its destination in digital form over a shared transmission channel. At the destination where the scrambled data is received, the hologram is displayed in a spatial light modulator and a conjugate reconstruction thereof is performed to generate a conjugate of the data-bearing signal waveform with distorted phase. A holographic medium having information indicative of the phase scrambling medium is used to unscramble the phase and the embedded data is retrieved from the conjugate reconstruction optical waveform by using a light detector array such as a CCD array.

Jackson at col. 3, lines 46 – 64;

An analog optical encryption system based on phase scrambling of two-dimensional optical images and holographic transformation for achieving large encryption keys and high encryption speed. An enciphering interface uses a spatial light modulator for converting a digital data stream into a two dimensional optical image. The optical image is further transformed into a hologram with a random phase distribution. The hologram is converted into digital form for transmission over a shared information channel. A respective deciphering interface at a receiver reverses the encrypting process by using a phase conjugate reconstruction of the phase scrambled hologram.

Jackson, Abstract.

Nowhere in the cited portions of Jackson reproduced above or elsewhere in the patent disclosure is there any description of dividing the optical signal into a first plurality of spectral sub-bands. The only use of the word “divide” is in connection with “subdividing into smaller packets as needed for transmission over the network.” See Jackson, col. 7, lines 34-35. There is no reference to dividing an optical signal. Likewise, the only occurrence of a form of the word “split” appears in claim 21:

21. A system as in claim 18, further comprising:
- a first electronic device, electrically connected to said first spatial light modulator, operating to split said first serial digital data stream into a first portion and a second portion, said second portion being sent to said first spatial light modulator; and
 - a second electronic device, electrically connected to said first detector array, operating to combine said first portion of said first serial digital data stream and said encrypted serial digital data stream.

Jackson, claim 21.

Thus, claim 21 describes “split[ting]” a first serial **digital data stream**, NOT dividing an **optical signal** into a first **plurality of spectral sub-bands**.

As a formal issue, it is further noted that, for the purposes of anticipation or obviousness, it is irrelevant whether a claim of a reference “reads on” Applicant’s claim; the relevant inquiry is

whether the claim teaches or suggests the subject matter of the claim. Thus, even if claim 21 were of sufficiently breadth as to encompass the subject matter of claim 1, it would not necessarily anticipate or render obvious the claim. In the present situation, claim 21 recites splitting a serial data stream, not an optical signal. Even if splitting an optical signal were to also effectively split a serial data stream, such would not defeat patentability of claim 1 absent an equivalence of the two steps; here there is none. Claim 21 fails to teach or suggest dividing an optical signal into a first plurality of spectral sub-bands and therefore fails to anticipate or render obvious the combination of claim 1.

In summary, claim 1 requires that the optical signal must be divided into a first plurality of spectral sub-bands. There is no teaching or suggestion in Jackson of dividing an optical signal into a first plurality of spectral sub-bands. Absent any teaching or suggestion of a combination including the step of dividing an optical signal into a first plurality of spectral sub-bands, the rejection based on Jackson is improper and must be withdrawn.

2. Modifying Each of a First Plurality of Spectral Sub-Bands to Encrypt Information Contained in an Optical Signal

Claim 1 requires that each of the first plurality of spectral sub-bands must be modified to encrypt the information contained in the optical signal. There is no teaching or suggestion in Jackson of modifying each of a first plurality of spectral sub-bands to encrypt information contained in an optical signal, and the prior Office Actions fail to identify any such teaching or suggestion. Absent any teaching or suggestion of a combination including the step of modifying each of a first plurality of spectral sub-bands to encrypt information contained in an optical signal, the rejection based on Jackson is improper and must be withdrawn.

In response to the asserted failing of Jackson, the Examiner states:

Regarding argument there is no teaching or suggestion in Jackson of modifying each of a first plurality of spectral sub-bands to encrypt information contained in an optical signal, remark page 3 par. 3, argument is not persuasive because Jackson discloses modifying the signals data and encrypting the signals see abstract, col. 4 lines 11-49, and

col. 11 lines 9-54 and this limitation is addressed by the examiner on the Office Action mailed on 3/12/08 page 4 par. 5 lines 8-9.

Office Action at page 3.

A review of the portion of Jackson cited by the Examiner reveals no teaching of modifying each of a first plurality of spectral sub-bands to encrypt information contained in an optical signal. The cited portions of column 4 describe various aspects of Jackson's invention including the use of optical phase information to encipher and decipher digital data including the use of data-bearing holograms. The cited portion of column 11 is a summary including a step of converting data into two-dimensional optical images. But, again, there is a complete absence of any description, suggestion or other disclosure of modifying each of a first plurality of spectral sub-bands to encrypt information contained in an optical signal. This is to be expected as Jackson fails to teach dividing an optical signal into a plurality of spectral sub-bands so that it is not surprising that the patent is silent on modifying each such spectral sub-bands.

In summary, claim 1 requires that each of the first plurality of spectral sub-bands must be modified to encrypt the information contained in the optical signal. There is no teaching or suggestion in Jackson of modifying each of a first plurality of spectral sub-bands to encrypt information contained in an optical signal. Absent any teaching or suggestion of a combination including the step of modifying each of a first plurality of spectral sub-bands to encrypt information contained in an optical signal, the rejection based on Jackson is improper and must be withdrawn.

3. Combining a Modified First Plurality of Spectral Sub-Bands into a Combined Optical Signal

Claim 1 requires that the modified first plurality of spectral sub-bands must be combined into a combined optical signal. There is no teaching or suggestion in Jackson of combining a modified first plurality of spectral sub-bands into a combined optical signal, and the prior Office Actions fail to identify any such teaching or suggestion. Absent any teaching or suggestion of a combination including the step of combining a modified first plurality of spectral sub-bands into a combined optical signal, the rejection based on Jackson is improper and must be withdrawn.

In response to the asserted failing of Jackson, the Examiner states:

Regarding argument there is no teaching or suggestion in Jackson of combining a modified first plurality of spectral sub-bands into a combined optical signal, remark page 3 par. 4, argument is not persuasive because see claims 17-18 that teaches combining the modified signals data. Moreover the 3/12/08 Office Action discloses this limitation on page 5 lines 1-2.

Office Action at page 3.

A review of the portion of Jackson cited by the Examiner reveals no teaching of combining a modified first plurality of spectral sub-bands into a combined optical signal. Claims 17-18 recite decryption of the second signal light beam using a second phase modulator to produce a third beam. Even if, as alleged by the Examiner, claims 17-18 might be interpreted as teaching combining "modified signals data" such would not anticipate or render obvious the combination of claim 1 including that the modified first plurality of spectral sub-bands must be combined into a combined optical signal. The claimed spectral sub-bands carry the information that is being transmitted such that they are recombined with each other into a combined optical signal. At most, Jackson combines a signal light beam with a reference light beam, not with another signal light beam much less a plurality of spectral sub-bands.

In summary, Claim 1 requires that the modified first plurality of spectral sub-bands must be combined into a combined optical signal. There is no teaching or suggestion in Jackson of combining a modified first plurality of spectral sub-bands into a combined optical signal. Absent

any teaching or suggestion of a combination including the step of combining a modified first plurality of spectral sub-bands into a combined optical signal, the rejection based on Jackson is improper and must be withdrawn.

4. Dividing a Combined Optical Signal Into a Second Plurality of Spectral Sub-Bands

Claim 1 requires that the combined optical signal must be divided into a second plurality of spectral sub-bands. There is no teaching or suggestion in Jackson of dividing a combined optical signal into a second plurality of spectral sub-bands, and the prior Office Actions fail to identify any such teaching or suggestion. Absent any teaching or suggestion of a combination including the step of dividing a combined optical signal into a second plurality of spectral sub-bands, the rejection based on Jackson is improper and must be withdrawn.

In response to the asserted failing of Jackson, the Examiner states:

Regarding argument there is no teaching or suggestion in Jackson of dividing a combined optical signal into a second plurality of spectral sub-bands, remark page 3 par. 5, and argument is not persuasive because Jackson discloses dividing the signal, modifying the divided signals to encrypt and combining them as discloses above. Jackson further discloses dividing the combined signal see claims 17-18, col. 9 lines 65-col. 10 lines 4 and col. 11 lines 21-28 as also disclosed on the 3/12/08 Office Action page 5 lines 3-4.

Office Action at page 4.

As discussed above, claims 17-18 describe a decryption device, not dividing a combined optical signal into a second plurality of sub-bands. Jackson at col. 9, line 65 – col. 10, line 4 describes use of a hologram having phase information of the waveguide medium to reconstruct an undistorted version of the original image. Again, there is no description of dividing a combined optical signal into a second plurality of sub-bands, only the mixing of images. Column 11, lines 21-28 discusses unscrambling the phase of a reconstructed optical image from holograms and the conversion of the 2D images into deciphered sequential digital data; there is no description of dividing the combined optical signal into a second plurality of spectral sub-bands.

In summary, Claim 1 requires that the modified first plurality of spectral sub-bands must be combined into a combined optical signal. There is no teaching or suggestion in Jackson of dividing a combined signal into a second plurality of spectral sub-bands. Absent any teaching or suggestion of a combination including dividing a combined optical signal into a second plurality of spectral sub-bands, the rejection based on Jackson is improper and must be withdrawn.

5. Modifying Each of a Second Plurality of Spectral Sub-Bands to Decrypt Previously Encrypted Information

Claim 1 requires that each of the second plurality of spectral sub-bands must be modified to decrypt the previously encrypted information contained in the optical signal. There is no teaching or suggestion in Jackson of modifying each of a second plurality of spectral sub-bands to decrypt previously encrypted information contained in an optical signal, and the prior Office Actions fail to identify any such teaching or suggestion. Absent any teaching or suggestion of a combination including the step of modifying each of a second plurality of spectral sub-bands to decrypt previously encrypted information contained in an optical signal, the rejection based on Jackson is improper and must be withdrawn.

In response to the asserted failing of Jackson, the Examiner states:

Regarding argument Jackson failure to teach modifying each of a second plurality of spectral sub-bands to decrypt previously encrypted information contained in an optical signal, remark page 4 par. 2, argument is not persuasive because modifying each second plurality of signals and encrypting is disclosed on claim 16 and col. 4 lines 11-19.

Office Action at page 4.

Claim 16 recites a second light source for decrypt the encrypted signal beam while the disclosure at col. 4, lines 11-19 describe an aspect of the Jackson invention of increasing the confidentiality of encryption schemes by using analog-based enciphering and deciphering. There is no description or suggestion that each of the second plurality of spectral sub-bands must be modified to decrypt the previously encrypted information contained in the optical signal. This is to

be expected because, as explained above, Jackson is totally silent about division of an optical signal into spectral sub-bands, relying instead on holographic techniques.

In summary, there is no teaching or suggestion in Jackson of modifying each of a second plurality of spectral sub-bands to decrypt previously encrypted information contained in an optical signal. Absent any teaching or suggestion of a combination including the step of modifying each of a second plurality of spectral sub-bands to decrypt previously encrypted information contained in an optical signal, the rejection based on Jackson is improper and must be withdrawn.

6. Claims 6-8

Insofar as Applicant has demonstrated above that Jackson does not disclose or suggest the subject matter of claim 1, and insofar as claims 6-8 rejected under §102(b) all depend from claim 1, it follows that these claims are allowable.

7. Summary

For the reasons presented above, the rejection of claims 1 and 6-8 under 35 U.S.C. 102(b) as being anticipated by Jackson is improper and withdrawal thereof is respectfully solicited.

Rejection of Claims 9-16 under 35 U.S.C. 103(a) as Being Unpatentable over Jackson USP 5,793,871 in View of Chen et al. USP 7,146,109

Independent claim 9 is patentably distinct from Jackson for reasons similar to those given above with respect to claim 1. Claim 9 is directed to a system for secure transmission of an information-containing optical signal comprising a number of elements in combination. The combined features recited in claim 9 are neither disclosed nor suggested in Jackson

The fundamental deficiencies of Jackson are not compensated by Chen et al., USP 7,146,109, alone or in combination.

Insofar as Applicant has demonstrated above that Jackson does not disclose or suggest the subject matter of claim 1 and, thereby, the subject matter of claim 9, and insofar as claims 10-16 all depend from claim 9, it follows that these claims are also allowable.

Rejections of Claims 2 under 35 U.S.C. 103(a) as Being Unpatentable Over Jackson USP 5,793,871 in View of Krause, USP 4,448,529; Claims 3 and 4 Over Jackson in view of Young et al. 2006/0291859; and Claim 5 Over Jackson in view of Soref et al. USP 6,114,994

Insofar as Applicant has demonstrated above that Jackson does not disclose or suggest the subject matter of claim 1, and insofar as claims 2-5 all depend from claim 1, it follows that these claims are also allowable. The fundamental deficiencies of Jackson are not compensated by any of the additional cited and applied references.

Conclusion

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark Office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no. 509622001100.

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